ONRL Report 7-033-C

The Twenty-Third International Applied Military Psychology Symposium

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30 December 1987

U.S. Office of Naval Research, London

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b RESTRICTIVE MARKINGS
2a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited
2b DECLASSIFICATION / DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) 7-033-C	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a NAME OF PERFORMING ORGANIZATION Office of Naval Research Branch Office, London 6b OFFICE SYMBOL (*If applicable*) ONRBRO	7a NAME OF MONITORING ORGANIZATION
6c ADDRESS (*City, State, and ZIP Code*) Box 39 FPO, NY 09510	7b ADDRESS (*City, State, and ZIP Code*)
8a NAME OF FUNDING / SPONSORING ORGANIZATION 8b OFFICE SYMBOL (*If applicable*)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c ADDRESS (*City, State, and ZIP Code*)	10 SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO / TASK NO / WORK UNIT ACCESSION NO

11 TITLE (*Include Security Classification*)
The Twenty-Third International Applied Military Psychology Symposium

12 PERSONAL AUTHOR(S)
William D. Crano

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (*Year, Month, Day*)	15 PAGE COUNT
Conference	FROM _____ TO _____	30 December 1987	28

16 SUPPLEMENTARY NOTATION

17 COSATI CODES		
FIELD	GROUP	SUB-GROUP
05	09	
05	10	

18 SUBJECT TERMS (*Continue on reverse if necessary and identify by block number*)
Manpower; Stress; Selection; Organizational Development; Retention; Technology Transfer

19 ABSTRACT (*Continue on reverse if necessary and identify by block number*)

Selected presentations given at this meeting held in June 1987 at Lisbon, Portugal, are summarized. Topics under which they are presented are: the relevance of psychology to the military; factors that affect retention of military manpower; stress and reactions to extreme conditions; selection; organizational development; and technology and technology transfer.

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL C.J. Fox	22b TELEPHONE (*Include Area Code*) (44-1) 409-4340 / 22c OFFICE SYMBOL 310

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted
All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

CONTENTS

THE TWENTY-THIRD INTERNATIONAL APPLIED MILITARY PSYCHOLOGY SYMPOSIUM

1 INTRODUCTION

The 23rd International Applied Military Psychology Symposium (IAMPS) was held from 1 through 5 June 1987, in Lisbon, Portugal. The meeting was hosted on behalf of the Portuguese Armed Forces by General Fernando Leonel Viegas Alvares. Local arrangements were made by Dr. Orlindo Gouveia Pereira, research director and professor at the Armed Forces Medical School.

This year IAMPS enjoyed one of the largest delegations since the series began in 1963. In all, 50 participants representing 17 countries spent a week discussing important issues of scientific interest relating to military psychology. It is my plan in this report to summarize some of the very interesting and high-quality presentations that were delivered at the conference. Given the number and quality of formal presentations, I will of necessity discuss each only briefly. However, the names and addresses of the participants are provided in Appendix A of this report. If more complete information is desired, the reader should contact these individuals directly.

The papers presented at the conference can be arranged in five general categories, which include:

- Retention of military personnel, with special focus on the family and military careers, women in the services, and the effects of drugs and alcohol on retention
- Behavior under stress and extreme conditions
- Selection--Particularly the selection of pilots
- Organizational development
- Technology, with special focus on technology transfer, and on the use of traditional and nontraditional socio-demographic information systems to develop predictive models of manpower availability, selection, and retention.

2 WHY IAMPS? THE RELEVANCE OF PSYCHOLOGY TO THE MILITARY

Some decision makers in the military, and some psychologists as well, do not feel that psychology has much to contribute to the military, and vice versa. For some of those who share a more favorable sentiment, the exact nature of psychology's potential inputs is far from clear. When queried about the value of psychology to the Armed Forces, most can mention the important work being undertaken on selection, stress, and attrition; beyond this important but rather limited realm, however, many would be hard-put to say more. In his opening remarks, however, Dr. Orlindo G. Pereira (Portugal) demonstrated the relevance of some of the central issues of psychology to crucial contemporary military problems. Issues from all areas of psychology appear fundamental to the most important military questions. I will quote this opening address liberally, since it sets the stage for almost all of the work that follows.

After the appropriate salutations to the visiting flag officers, six of whom attended the opening session, Pereira began by observing that those who controlled the destiny of the armed forces needed to realize that psychology can be a decisive and invaluable factor for increasing military effectiveness. To show how and why this was so, he made use of a military incident involving the US Navy, and highlighted some of the many psychological questions it stimulated.

Pereira began his talk with the observation that the fact that the USS Stark recently had been hit by an Exocet missile. "To some," he observed, "this entire episode is being viewed as nothing more than an unfortunate accident." He went on to say:

> However, was it a mere accident, or a culpable error on the part of the pilot? Did the pilot of the Iraqi Mirage make a simple mistake, or was his mistake preventable? Were the defenses of the frigate down because of the carelessness of the system's operators, because of the unclear

> circumstances of the Stark's mission--did the Captain know if he was at peace or at war?--or because of a more complex collective blunder?

These questions demand answers, and it was Pereira's contention that psychology can help provide them. He then continued:

> Apparently, the Mirage pilot mistook the frigate's running lights for those of a tanker. Why? Or, rather, how? Was this misidentification also a problem attributable to having received an unclear mission? To the stress of the job? To a failure of training? Or to a fundamental perceptual deficit?

Such are some of the classical problems of applied military psychology: expectancy, discrimination, training, and selection. If we now look at the people aboard the Stark, things become a bit more complicated. Obviously, the same classical problems of expectancy, discrimination, etc., can and should be considered. But a crew of 221 men provides, by itself, a new set of questions. A crew is a group. It is also a set of groups, both formal and informal. Groups have leaders. People in groups act differently than people alone. They even make different errors. We know that grievous blunders in air-traffic control, piloting space ships, and in the control jobs at nuclear plants are more probable when people act in the presence of others than when they are alone.

Considering all of this, it is clear that a series of questions of a social psychological nature follow on the heels of the classical issues of individual psychology that were raised earlier. They are relevant for another reason as well, namely that the lives of military men are lived only partially in the military. Outside of the limits of the military, such men have families, suffer stress, debate social questions, and participate in many other ways in the life of the civil society. Such society is today divided in many ways that influence the military. Society has created many factors that are the equivalent to war, such as terrorism, sabotage, and other forms of illegitimate coercion. And psychology has much to say about these issues as well.

But wait--couldn't the Stark incident have been just an accident, just an equipment failure? Weren't there reports that a computer problem had been detected some time before? Yes, but even so, computers have to be manned. The problem ultimately becomes one of the human operator or, better, the man-machine system. Human factors engineering, the discipline that is focused on issues such as these, is basically a subfield of psychology--and one, not incidentally, that has stimulated the interest of countless military psychologists. Indeed, it is to questions of the type raised here that we will focus our consideration in the coming symposium.

And now, without further delay, let us begin this consideration.

3 FACTORS THAT AFFECT RETENTION OF MILITARY MANPOWER

At the 22nd IAMPS in Rome last year, considerable research on selection was reported. At this meeting, too, selection was a focus of much concern. However, taking pride of place in Lisbon was not selection, but retention--keeping those who have been selected. I believe that this switch in emphasis is not a chance fluctuation, but rather reflects a problem that is becoming more and more common in the countries represented at the symposium (see also *ESN* 10:539 [1987]). A combination of accelerated resignations, a drop in the birth rate, and reductions in military spending have all resulted in a renewed interest in the retention of manpower.

Australia

The first speaker to address the retention issue was Lieutenant Colonel Brian Hodge (Australia). Over the years, the resignation rate of officers in the Australian Army has been small and

relatively constant, with fluctuations usually on the order of 1-2 percent. Turnover thus was predictable, small, and within the capacity of the Army to provide for replacements. Over the past 2 years, however, turnover has accelerated and, faced with cuts in defense appropriations, replacement to authorized manpower limits has become problematic for the Australian Army.

It often is the case that a pickup in the domestic economy is followed by an accelerated rate of resignations in the armed forces. However, such was not the case in Australia, where the unemployment rate is 10 percent nationwide, and up to 20 percent for youth below the age of 20. What, then, is the reason for the upturn in resignations? To attempt to answer this question, the Psychological Research Unit of the Australian Army conducted a series of personnel surveys whose description and results were the focus of Hodge's remarks. The results of two of these complement each other, and provide some grounds for understanding the factors that weigh heavily in Australian soldiers' decisions to leave the Army. Briefly, the surveys that have been conducted are as follows:

Soldier Attitude and Opinion Survey (SAOS). In late 1986, 20 percent of the entire Army population was randomly selected for study. Ninety-two percent of the 5000 soldiers who had been sent surveys responded. The survey was an anonymous questionnaire that solicited a broad range of biographical data, along with information regarding length of service, rank, type of unit, etc., and a 38-item attitude scale designed to tap soldiers' feelings toward various aspects of service life. In addition to the grand survey, a 2-percent quarterly follow-up administration (to randomly selected respondents) is planned; at the time of the symposium, the first of these (March, 1987), had been completed.

SAOS Follow-up. Changes in soldiers' attitudes over time can be detected by comparison of the 20-percent sample with the data of the smaller (2 percent) follow-up group. In addition, the data may be used to assess the effects of variations in social, political, and economic trends. The major utilization of the SAOS will be as a data base for policy planners, who might wish to study or isolate the effects of a specific variable, or variable set. At present, the Personnel Research Unit has the capacity to answer almost any question of this type within 24 hours.

Officer Resignations. A second survey was administered to all resigning officers. However, the survey was submitted through the officers' commanders, and this led to a situation in which "nearly all officers swore their undying allegiance while tearfully lamenting their departure to take up a unique resettlement opportunity." A change in procedure, in which the survey is completed and returned anonymously, has made for a major enhancement of data quality. However, since the number of officer resignations is (thankfully) small, little can be said of the data at this point.

Other Ranks (OR) Survey. Since January 1987, every soldier voluntarily discharged from the Australian Army is asked to complete an exit survey, consisting of the 30 socio-demographic questions of the SAOS, 44 items tapping reasons for leaving the Army, and 40 items relating to factors that might have motivated the respondent to stay. At this point, 800 surveys have been collected, and their analysis was the focal point of Hodge's review.

Results. Some of the findings developed to this point are quite intriguing. For example, the bulk of resignations occur among soldiers between 20 and 30 years of age, and the rate of discharge is disproportionately high among those who enlist before age 20. Gender and marital status had no differential effect, nor did posting location or type of unit. Nearly 50 percent of the Army-leavers did not have a job waiting, although most expected to find one within 3 months.

Stated reasons for leaving (or factors that would have encouraged reenlistment) also were intriguing, and corresponded well with the results obtained

Table 1
Factors that Encourage, or Mitigate Against, Reenlistment

Negative Factors	% Mention	Positive Factors	% Mention
Insufficient compensation for overtime	64	Higher pay	63
Army career management	52	No further erosion of conditions of service	62
Government attention to defense issues	50	More frequent pay and allowances reviews	61
Desire to live in one's own home	48	Less bureaucracy	60
Desire to try one's talents in civilian life	47	Better communication to all ranks by superiors	59
Expectations of the Army not fulfilled	45	Better understanding by politicians of problems of Army personnel	58
Lack of support from officers	44	Better Defense-Services Home Loan Plan	56
Civilian counterparts are better off	44	More increments for Time in Rank	56
		Better Leadership by Superiors	56

in the SAOS. A factor analysis of the attitude scale administered to the 4600 respondents who participated in the SAOS disclosed four factors; however, only the first of these factors accounted for more than 3 percent of the variance. In fact, the items that appeared to weigh most heavily in determining soldiers' attitudes regarding reenlistment or resignation were all focused on the comparison between Army and civilian life. In Thibault and Kelley's (1955) terms, it was the *comparison level for alternatives* that shaped the reenlistment decision. In other words, it was not the absolute quality of life in the Army (or the anticipated quality of civilian life), but the relative difference between these two possibilities that mattered. Thus, Army life could be horrible, but if the alternative were no better, or worse, then no changes would be anticipated; or, it might be wonderful, but if the civilian alternative were seen as better, then the absolute quality of life would not have any impact on decisions.

The OR survey of voluntarily discharged soldiers pinpointed the particular aspects of army life that suffer most in comparison with civilian life, and which arguably were the most important determinants of retirement from the Army. Recall that soldiers were asked to respond to a series of factors that influenced their decision to leave, or which might have encouraged them to reenlist. The eight items that had the most profound influence on their decision to leave are presented in the first column of Table 1; the factors that would have had the most positive influence on soldiers' decisions for reenlistment also are presented in the table.

Clearly, compensation looms large as an issue in reenlistment decisions in the Australian Army, but it would be a mistake to attribute all of the decision weight to this factor. Equally telling are soldiers' perceptions of their evaluation, both by officers and politicians. The results of this survey suggest that the soldiers who leave the Army are dissatisfied with their officers, and with the general political climate within which they must work. They do not appear to feel that they are valued by their immediate bosses, nor by the politicians whose decisions ultimately affect their lives. It might prove less a job to change soldiers' perceptions of the way their bosses view them than the pay structure of the Army.

Sweden

Research directed toward the issue of retention was also undertaken in Sweden, and presented by Drs. Ebbe Blomgren and Berit Stahlberg Carlstedt of the National Defense Research Institute. As in Australia, the Swedish Army has experienced an increase in voluntary resignations from all of the officer ranks. Sweden's Department of National Defense posed the straightforward but far from simple question to the Research Institute--"Why?"

Since it was felt that a senior officer's reasons for resignation might be very different from those of a junior officer, officers from all ranks of the Army were interviewed. Blomgren and Carlstedt hypothesized that three general areas of concern--the comparison between civilian and military work, perceptions of military life, and career expectations--might prove especially influential in determining the course of officers' careers, and they focused their research efforts in these general directions.

Senior Officers. The first series of interviews were administered to Majors and Lieutenant Colonels who had resigned their commissions. All the Lieutenant Colonels had completed the highest course in the Armed Forces Staff College, and half of this group had been selected for further staff enhancement. When interviewed, these men noted that they began to consider resignation when they could not envision their future in the Army--i.e., when they had little idea of what lay ahead, and consequently little control over the future direction of their lives. The precipitating cause of resignation often was an assignment to a job or location that they found intolerable. Another common resignation trigger was the offer of a job in the civilian economy.

Blomgren and Carlstedt asked the former high-level officers to compare their civilian jobs with their past Army employment on 17 different factors, and on 14 of these, the civilian job was found to be superior; on three others (cohesion, stress, and working overtime), civilian and military careers were viewed as equivalent. Among the factors on which a civilian career was viewed considerably more positively than a military one were the following:

- Better feedback on performance
- More responsibility
- More inspiring and variable tasks
- More distinct goals
- Better possibilities of performing a job from beginning to end
- Better possibilities of influencing one's future and salary
- Better possibilities of using and developing competence
- More freedom to use one's own initiative.

Junior Officers. A somewhat different set of issues face the junior officer in his or her decision to remain in the armed services. In an interview study of 90 junior officers who had resigned their commissions, Blomgren and Carlstedt found that their first seeds of doubt in a military career were concerned with the Army's rigid way of handling personnel problems, the ways that performance was evaluated (or not evaluated), and the slow rate of advance in pay that they could foresee. At the time of resignation, only 20 percent of the young officers had a job awaiting them in the civilian economy. Those who were working (as opposed to those who went back to university studies) evaluated their civilian jobs (versus their previous Army job) in much the same way that the senior officers had in the previous survey. In brief, the civilian job was seen as more challenging, more interesting, more likely to take advantage of their skills, and more highly paid.

As with the senior officers, the inability of the junior ranks to form a clear picture of the future also weighed heavily in their decisions to resign. In 1982, a structural change in Swedish Army training philosophy required all officers, no matter what their specialization, to proceed through the same set of training schools. During the initial course of a military career, this progression entailed five different schools over a 10-year period. However, the young

officers never knew when they would be assigned a particular training school, nor the level at which their career would be arrested. The problem of uncertainty is a major one, since all of those admitted to the officer corps are presumably sufficiently qualified intellectually to reach for the highest levels of command, yet it is obvious that there is not enough room at the top for all. Since all must pass through the same schools, there is little possibility to develop special competencies that would lead to recognition at different positions (at different levels) in the organization. According to Blomgren and Carlstedt, the young officers want "different courses that lead to different levels in the organization, with demands for admission that are in agreement with the future work that the officer will have. In this way, pride in work could be high on all levels." Such a suggestion has much to recommend it. It would not only result in higher morale, and thereby foster retention, but also facilitate development of a cadre of officers more finely trained for the specific jobs to which they were assigned. Such a systemic change is much more unwieldy organizationally, but from the perspective of retention of military personnel and operational effectiveness its advantages might outweigh costs by a wide margin.

Switzerland

Arguably, the seeds of military retention are sown during the initial introduction to life in the armed services. Working on this assumption, Dr. Jean Pierre Pauchard attempted to determine the factors that influenced recruits' adaptation to basic training in the Swiss Army. Each year, 40,000 young men take part in basic training in Switzerland. The Swiss Army is a militia--all Swiss men during their 18th year must take part in military training, and this training is reinforced over the years, as the men become part of the reserve. In attempting to determine the particular aspects of basic training that helped or hindered adjustment to army life, Pauchard adopted an investigative approach typical of life-events research. First, he asked one group of trainees to list the aspects of basic training that they found most difficult. From their responses, he constructed two scales: one to assess adaptation to basic training, another to evaluate basic training stressors.

Having constructed these scales, he then asked another group of 238 trainees at the beginning of their tour to predict (on 19-point scales) the degree to which 21 different life events factors would influence their adjustment to basic training. Thus, for example, a respondent would be asked to rate from indifferent to agreeable the "Change in physical effort" that would characterize basic training (in comparison with that experienced in civilian life). Examples of other adjustment factors that were to be rated from indifferent (Point 1 on the 19-point scale) to extremely disagreeable (Point 19) were:

- Change in financial status
- Change in free time
- Change in hygienic circumstances
- Change in personal appearance, etc.

Pauchard then readministered this adjustment test at the completion of training. The items listed above were the only ones of the 21 whose end-of-training rating was significantly different from that expected. For example, in estimating potential difficulties to adjustment to Army life, the Swiss trainees ranked separation from girl friend as the factor that they felt would make for the most major problems of adjustment to the Army. When tested after training, this factor was ranked second--the trainees had anticipated correctly. However, change in free time, which had been ranked fourth in expectations of adjustment difficulties, was actually found by the recruits to have been the most difficult feature of Army life to which they had to adjust. Change in financial status, anticipated to be a major problem (pretraining rank = 2) was perceived after training to have been much less important (posttraining rank = 7). Changes in hygienic circumstances (i.e., inability to take a shower

whenever desired, necessity to share toilet facilities, etc.), thought at pretraining to be a minor inconvenience (ranking = 8), was found to be a much greater problem during training (posttraining ranking = 3). Change in personal appearance was thought to be a moderately important determinant of training adjustment difficulties at the initial measurement session (ranking = 10), and at training completion, was judged even less important than this (ranking = 15). Over all, the association between adjustment items at pre- and posttraining was very high (rank correlation = 0.93), indicating that the factors the recruits thought would prove problematic did, indeed, hinder their perceived adjustment to the Army.

Pauchard used the same general testing approach to determine the effects of 32 stress-inducing events that might be encountered in basic training. Those basic training events whose extent of anticipated stress arousal differed substantially from that reported after training are summarized in Table 2. As shown here, there was good agreement between anticipated stressors and actual stress (rank correlation = 0.89). The departures from prediction, however, are also interesting. Unanticipated difficulties that proved most problematic included idleness, eating little or badly, loss of personal equipment, confrontation with group members, bad weather, and dislocation. Factors that were anticipated to cause problems, but which in fact were less problematic than expected, were detention, no leave, and loss of a military object by the platoon (in such an event, the platoon pays for the object).

The approach adopted in this research appears promising. It would seem to allow training specialists to learn about the factors, real and anticipated, that interfere most with training. The stress factors that occur at the very top of the trainees' lists could be modified in some cases, to make the training experience more effective and more efficient, thus producing better-trained soldiers who, not incidentally, would be more likely to retain a positive attitude toward the armed services over the years.

Israel

Clearly, there are many factors that influence reaction to military life, and a person's consequent decision to remain in the armed services or to move into civilian society. One of the most important of these decisive factors is the reaction of the serviceman's family to the demands placed on the professional soldier--and indirectly, on the family itself. The Israeli Army has recognized this obvious, but often overlooked fact, and has begun a program whose aim is to resolve the relational conflicts that a career in the armed services sometimes can foster.

In discussing this work, Lieutenant Colonel Shimariau Sheppes of the Israeli Defense Forces observed that in many military families, apparently irresolvable conflicts are brought about by the very incompatibility of the profession of arms and the family. For example, a wife has a legitimate claim on her husband's time in helping to raise the children. But if the husband is in the field, such help is a physical impossibility. The incompatibility of the demands of family and job is not easily resolved. Because such problems sometimes cannot be handled by those embroiled in them, they are displaced--that is, other, lesser issues become the focus of an often ritualized conflict. So, rather than reacting to the husband's absence at critical times in the development of the family, the wife might complain to the husband that whenever he is home, the house is always in a terrible state. The husband might reply that his wife is more interested in order than in comfort. And so on. The underlying cause of this conflict is never recognized in this conflict system, and thus it acts as a constant stimulus to further disruption. The failure to resolve the deeper problem weighs on the family, which eventually must resolve the issue or disintegrate.

According to Sheppes, the IDF has become more and more concerned about

Table 2
Ranking of Stress Inducing Events of Basic Training;
Expected vs Experienced Stress Rankings

Item	Anticipated Rank	Post-Training Rank	Discrepancy
Weekend Duty	1	1	0
No Leave (as punishment)	2	5	-3
Role call 1 hour late	3	3	0
Short weekend leave	4	2	2
Frequent/quick change of uniform	5	9	-4
No day out (as punishment)	6	13	-7
No personal hygiene > 24 hours	7	8	-1
Order and counterorder	8	7	1
Little or bad sleep	9	10	-1
Idleness > 1 hour	10	4	6
Transfer to another company	11	11	0
On guard for 24 hours	12	15	-3
Eating little or badly	13	6	7
Exercise, weapon drill	14	14	0
A 3 day detention	15	20	-5
Loss of personal equipment	16	8	8
Bad weather	17	12	5
Night exercise	18	16	2
Harmless disease/injury	19	21	-2
Loss of military object by platoon	20	26	-6
Inspection or test	21	24	-3
Serious illness of comrade	22	17	4
Serious confrontation with superior	23	27	-4
Physical effort > 1 hour	24	23	1
Damage of Army material	25	25	0
Confrontation with group member	26	19	7
Bad result in special training	27	28	-1
Dislocation	28	22	6
Reproach by superior	29	20	9
Short duration physical effort	30	30	0
Stay at sick bay	31	32	-1
Bad result at shooting	32	31	1

problems of this type and the difficulties they entail, and has designed a number of programs to combat them. The particular program that Sheppes discussed at IAMPS is presented in the framework of an encounter group, which husbands and wives (but not children) both attend. To this point, only officers and their wives have been involved in this program. In the group context, couples are induced to come to grips with the real difficulties that the military life imposes on the family, to recognize these difficulties for what they are, and to attempt to cope with them, rather than to devise alternate foci of conflict which serve as surrogates, deflecting attention from the real problem. The precise details of the encounter session are beyond the scope of this report, but it is interesting that

the IDF has realized that an important problem in the (family) lives of its officers might exist, and has embarked upon on a program of this type to alleviate it.

To this point, there are no longitudinal data available comparing the effectiveness of the officers who have undergone the training and those who have not. Important measures in an investigation of this sort would include differential divorce rates between program participants and nonparticipants, rate of officer retention, self-ratings of marital happiness and job satisfaction, personnel ratings by superior officers, etc. One of the problems of all research of this type is that only volunteers be used. It is not reasonable to force a couple to undergo this regimen against their will. This leads to the question of differential selection, and the problem this poses for proper inference and evaluation of an experimental treatment. An officer who refuses to participate may do so because his or her marriage is the picture of happiness and contentment, and such a program would prove a waste of time and money. On the other hand, the refusal might be based on a feeling that the marital problems are so profound that nothing could be done to alleviate them, or that the problems are not fit to be aired in public. Are, therefore, the volunteers for the program those who, at worst, are experiencing only minor problems? Are those most in need refusing to participate? Only further research can answer these questions.

No matter what the answer, this program strikes me as a *potentially* valuable approach to the alleviation of a real problem, and it will be interesting and important to monitor its impact over time. Perhaps in a year or two the Israeli representative to IAMPS will be able to furnish information on the program's effectiveness.

Canada

A major means of avoiding the problems of manpower loss in the armed services is to rely more heavily on womanpower. This is not a novel approach, but one whose full potential has yet to be exploited by most countries. Captain Cheryl Lamerson of the Canadian Forces Personnel Applied Research Unit discussed an extremely interesting series of investigations aimed at understanding the implications of the integration of women into more and more of the military specialties previously reserved for men.

She began with the information that women have served in the Canadian armed forces for more than a century, in a variety of roles. In World War II and the Korea Action, for example, Canadian service women flew aircraft, operated radar and radio stations, and drove heavy equipment. However, after each conflict, the general demobilization that followed effectively closed the door to women in the armed services.

Only 20 years ago, there was a permanent ceiling of 1500 service women in the unified Canadian Forces. However, Canada's Royal Commission on the Status of Women ruled in 1967 that opportunities be expanded to allow for women's more active involvement in society and industry, and this advice was taken seriously by the unified Canadian Forces. With the exception of primary combat, service in isolated settings, sea service, and admission to CF Military Colleges, all gender-based restrictions were eliminated by 1971. By 1980, women were admitted to the colleges, and a 5-year study on the effects of integrating women into many heretofore prohibited settings was inaugurated.

In the study of service women in nontraditional environments and roles, women were assigned to land, sea, or air near-combat units (i.e., units not expected to engage hostile forces, but which could come under attack) or to an isolated installation in the Arctic Circle. Two independent evaluations were conducted in these trials: operational commanders assessed the women's overall impact on the operational effectiveness of their units, and the Canadian Forces Applied Research Unit evaluated the human, or social, consequences of servicewomen's entry into heretofore male-dominated specializations and settings.

In making this latter evaluation, measures of the attitudes and behaviors of the women's male coworkers were collected. These results were the central focus of Lamerson's discussion, the (reasonable) assumption being that acceptance by coworkers was a crucial factor in determining the cohesion and morale of an operational unit.

As noted, the trials took place in land, air, and sea near-combat units, and in an isolated monitoring station in the Arctic Circle. In the monitoring station, women were fully accepted by their male coworkers, and also rated highly by their commanding officer. So successful was this "experiment" that women now serve routinely in CF isolated units.

Results in the near-combat units were not quite so spectacular. In general, large minorities of servicemen did not view their female peers as contributing equally to the necessary tasks in the land or the sea trials. In four of the five air crew trials, females were rated as capable by their male coworkers, who felt they should continue to serve; in the fifth trial, the evaluation was not positive.

Over the 5-year period of these trials, further evolution in Canadian views on human rights occurred, and these changes necessitated a review of Canadian Forces' practices. At this point, women can be employed in nearly 75 percent of all specialties, the exceptions being anti-submarine, fighter, and tactical helicopter squadrons in the Air Force; infantry, artillery, armored, field engineer, signals, and field intelligence units in the Army; and destroyer and submarine fleets in the Navy. However, review of even these restrictions is currently ongoing. At present, field trials to determine the suitability of women in combat roles are being planned. No doubt future IAMPS will profit from reports of the outcomes of these studies.

4 STRESS AND REACTIONS TO EXTREME CONDITIONS

Denmark

Suppose you were offered the opportunity to patrol the north and north-east coast of Greenland, accompanied by only a coworker--and, of course, the dogs to pull your sled. Interested? Then you should know that the patrol is a 25-month job, and that you will be in the field for the entire period, during which you will spend most of your evenings in a very small tent with your partner, or in abandoned trappers' cabins--those that the bears have not destroyed, that is. Still interested? Then you also should know that for 3-4.5 months per year, the sun remains below the horizon. This tends to restrict movement. Also, the temperature can fall to below 50 degrees Celsius, although the average temperature is a comparatively balmy minus 10. Winds sometimes can pose a problem too, with readings of up to 100 knots (nearly double hurricane strength) in the north. Since your patrol covers 16,500 km, you will have to average 35 km per day on patrol; this will take from 4-8 hours each work day. Oh yes, there are no week-ends in this job. Over the course of the patrol, you will travel 3800 km, the distance between Lisbon and Moscow. With luck, you will encounter no one in the winter months. If you do, your territory probably is under invasion. In summers, you might run into an occasional scientific party, but unfriendly polar bears are much more likely. Since the sleds are so heavily loaded, you will have to ski alongside so as not to overtax the dogs. Of course, in heavy weather you must ski in front of the sled to break a trail for the animals.

You will receive practical training for this patrol--aircraft recognition, meteorology, shooting, and fire-extinguishing are but a few of the useful skills you will learn. However, first aid training is not one of these, since there is no "second aid" on this patrol. Still interested? Then you may apply for service in the Sirius Sledge Patrol. As Dr. Stig Meincke of the Danish Defence Center for Leadership explained, selection to this patrol is based on a standardized 1-day testing procedure, during which the candidate is given tests of IQ, English proficiency, mechanical comprehension, general information, and personality. In

addition, he must write an autobiography, submit to a Rorschach test, perform in a group exercise monitored by psychologists, and undergo a series of interviews with psychologists. Unmarried males between 20-30 years of age, with a sturdy, uncomplicated personality, good social skills, tolerance, and emotional stability have a chance for the patrol. And, of course, you must be an NCO in the Danish Defence Forces.

The picture that I have sketched here is a summary of the report that Meincke delivered about this very unusual, and dangerous, duty. The description of the privations and dangers, isolation and loneliness, that awaits the volunteer for the Sirius patrol led many IAMPS participants to assume that it always would be undermanned. Such is far from the case. In fact, more than sufficient numbers volunteer for this arduous duty. Stress, both physical and psychological, is an almost constant feature of the patrol. However, by appropriate selection techniques, the core of which are psychological interviews, the Danish Defense Centre for Leadership has been able to man the Sirius patrol with competent and capable individuals, who appear to thrive on its numbingly difficult regimen. During training in Greenland, standard sociometric measures are employed to determine the composition of the various sled teams. This application of one of social psychology's old but still respected technologies appears to work very well indeed. If nothing else, the success of the selection process, the training, and the assignment of men to teams points to the quality of the psychological procedures used to determine who will go to Greenland, and with whom they will patrol when they get there.

Belgium

A different form of stress is experienced by the victims of terrorism, a topic addressed in an informative and interesting presentation by Commandant Guy Pelsmakers of the Belgian Gendarmerie. Pelsmakers is an expert in counter terrorism, and his talk at this year's IAMPS was concerned with the "active" (or, secondary) victims of terrorism--the friends or relatives of those taken hostage and held for ransom, the police who must deal with the family of the victim and with the terrorists, the politicians put under pressure by families and friends of hostages, etc. Pelsmakers terms these people "active victims" because they are also held captive, at least in a psychological sense, by the terrorist. As such, they are subject to stresses that sometimes can closely resemble those of the actual victim--and they must be treated accordingly.

Pelsmakers focused principally on the families of those victimized by terrorists, with specific reference to hostage situations. He argued that the stresses experienced by the active victim be considered from the outset of the crisis situation. This advice was rendered not solely on humanitarian grounds. The so-called "Stockholm syndrome," in which victims ultimately come to identify with their captors, can be experienced by active victims; and if this occurs, the likelihood of a successful conclusion to the crisis, with the safe return of the hostage, is dramatically reduced. Thus, for pragmatic as well as humanitarian reasons, the active victim of a hostage-taking situation must be helped.

Pelsmakers laid out a number of ground rules for guidance in these matters. They are presented here in capsule form:

The Preparatory Phase:

- Keep the active victims informed about developments. Reduction of uncertainty reduces stress, and also helps to enhance confidence in the work of the authorities.
- Encourage the active victims to function as normally as possible. Provide means to facilitate this.
- Help active victims to make contact with other active victims (if any) who are in a similar fix.
- Inform active victims of all the measures being taken to help the hostage.

- Give clear directions to active victims regarding the means to cope with outsiders, the media, etc.
- Help find programs to treat ex-hostages and their families (active victims), and inform victims about this. Knowledge that such programs exist can help prevent post-traumatic difficulties.

The Near-Return Phase:

- Inform the active victims about the likelihood of the return of the hostage. Do not spring a surprise homecoming on them.
- Remember that the return of the hostage can, in itself, have a traumatic effect on the family, and vice versa, especially if the hostage has been held for a long period. Hostage and active victim must be told in detail about the experiences of the other(s) during the trauma, hence the need for a detailed log of events during the crisis.

The Post-Return Phase:

- Authorities must keep in contact with victims and their families, to the extent desired by the families.
- Authorities must provide assistance to victims and their families to the extent possible; this includes psychological assistance along with financial support.
- Families should be encouraged to celebrate the return of the victim, without interference from the outside.

Based on his experiences, Pelsmakers assured IAMPS participants that these steps would help to ensure a more satisfactory conclusion to a hostage-taking, and also facilitate the reintegration of the victim into society. The detailed methods for accomplishing all of these recommendations gave clear evidence of the amount of thought devoted to this process, and to the technology that has been developed to ameliorate some of the problems of terrorism.

Italy

A different kind of stress was discussed by Colonel Attilio Ferrarello of the Italian Army. Universal military conscription is the rule in Italy, with call-up notices sent out every 4 months to young men who have reached draft age. Recently, the Army has experienced an unfortunate upswing in the suicide rate of conscripts in basic training. The figures tell the grim tale: in 1984, there were 9 suicides; 11 in 1985, and 23 in 1986. If the trend of these data is extrapolated to 1987, the resulting estimate is frightening. What can be done? This was the question posed by Ferrarello to the IAMPS participants, before he detailed his country's response.

The Italian induction process includes three phases: call-up, physical examination, and psychological/aptitudinal selection. To try to offset the growing suicide problem, an Italian version of the MMPI is administered to all draftees, and it is followed by a psychological interview if indicated by this test. This program is new, and Ferrarello expressed hope that it would allow the Army to identify conscripts who were likely to have problems. Other suggested possibilities include a change in the structure of the basic training regimen, so that the extreme stress and loneliness that sometimes characterize this phase of training might be offset. Some of the participants expressed doubt that the MMPI approach would solve the problem. This is an empirical issue, and we all hope that the method has the intended effect. Certainly, the test should allow the identification of conscripts with long-term psychopathologies. However, whether the MMPI approach will be effective in isolating the conscript who finds suicide a reasonable option as a result of the accumulation of a host of problems--physical exhaustion, loneliness, loss or absence of a loved one, etc.--remains to be seen.

Portugal

The Portuguese were involved in a counterguerrilla movement in Guinea-Bissau, Angola, and Mozambique from 1961 to

1974. During part of this time, Dr. Orlindo G. Pereira served in the field, and was able to study the stress-related behaviors that affected the Portuguese marines, who were involved in the fighting more than any of the other services. Conscripts were officially bound to serve only one tour of duty (18-24 months) in the colonial war. However, informal government policy at the time did not allow retirement or resignation from the service; accordingly, many were faced with the choice of "volunteering" for another tour at substantially greater salary (as career officers), or "volunteering" for another tour for substantially less salary. Some served as many as five consecutive tours of duty.

In general, those who served more than one overseas tour in the war zone were susceptible to one or a combination of the following symptoms: more or less permanent nervousness and irritability; difficulties in interpersonal relationships; explosive, and apparently unmotivated aggressiveness; memory loss; and sleep disturbances. Most suffered progressive losses in the performance of complex tasks, in some cases approaching the performance decrement found in those diagnosed as having "supraliminal" brain damage syndrome. Reaction times in a Stroup test were 25 percent slower than average. Prognosis for this curious set of problems is not good. Drug therapy, for example, provides little hope for improvement.

To try to learn more of this syndrome, Pereira conducted field studies in Guinea-Bissau from 1964 to 1966, with a follow-up in 1981. He interviewed a sample of 153 marines every 6 months for 2 years. Two groups, one in Lisbon and another in Guinea-Bissau (deskbound Navy officers) served for comparison purposes. The marines were divided further into two groups: 26 naval marines who had a low probability of engaging in combat, but were continuously involved in security; and 127 special marines who were involved in intensive combat, usually of about 24 hours' duration, separated by periods of quiet of 5-7 days.

Results of this study indicated that different patterns of stress induced different patterns of symptoms. The Navy officers posted to a desk in Guinea-Bissau tended to develop hypocondriacal and depressive symptomatology. The special marines (high probability of combat) were likely to alter their interpersonal relations, becoming more and more antisocial and detached from reality. The naval marines (low combat probability) were somewhat similar to their marine brothers, but their symptoms were somewhat attenuated.

No one adapted to the stress of combat. When rumors of an operation developed, the general activity level of the group increased in a crescendo up to the time of combat. More alcoholic beverages and tobacco were consumed, there were higher levels of sexual activity, more letter-writing home, etc. The increase of these activities was directly related to the soldier's subjective estimate of the danger to be faced.

The intermittent repetition of arousal of this nature had a cumulative effect on the marines. The stress-related syndrome described earlier typically appeared only after more than one duty period, and became progressively worse as duty time mounted. Another extremely important finding of this field study was that the effects of combat stress were markedly attenuated in units that maintained high morale. Whether this effect was due to leadership, a more global group cohesiveness factor, or both, could not be determined on the basis of the research operations.

Stress in training. A second study on the effects of stress in military contexts was reported by Dr. Jorge Correia Jesuino, for the Portuguese Navy. Jesuino investigated the stress/coping reactions of a cadre of naval cadets as they progressed through a 9-month training course. The course was known to be physically rigorous, as well as psychologically challenging. Observations included weekly interviews to assess cadets' adaptation to the school and the effects of socialization on their reactions. In addition, a series of

standardized measures were administered over the course of the study, including:

- The MMPI (cf. Hathaway, 1964) and the Tennessee Self-Concept Scale (TSC) (Fitts, 1965), administered at the beginning of the training period.
- A sociometric measure (SYMLOG) of each trainee's evaluation of the group (cf. Bales & Cohen, 1979), taken at the halfway point in training. SYMLOG allows for the evaluation of the group along three dimensions: dominant/submissive, friendly/unfriendly, and instrumental/expressive.
- A measure of the training context, focused on (1) the general level of ambiguity present in the situation, (2) the degree of emotional investment in the training, (3) the general evaluation of the training, and (4) the extent to which the trainee feels he can control the factors with which he must contend. This test was administered at the middle of the course and at its completion.
- A comprehensive stress audit, which asked the candidate to rate how stressful various aspects of training had been in the previous 6 months, and how stressful he anticipated these same aspects to be 6 months hence. This test was administered at the beginning, middle, and end of the course.

The results of the study disclosed that stress progressively declined over the course of training, as might be expected. Relations between stress and the various personality measures taken (MMPI, TSC) were negligible. The relations between SYMLOG scores and stress were somewhat more informative. At the beginning of the course, stress was related to the friendly/unfriendly SYMLOG dimension: the less friendly the trainee perceived the course, the more stress he reported experiencing. In the middle of the course, the instrumentality/expressivity dimension appears to predominate. Those who are unable at the course's midpoint to deal with the instrumental demands of the group are most stressed. At the end of the training, there is no significant relationship between the various SYMLOG dimensions and stress.

The analysis involving stress and the training context measure also revealed some interesting results. From the first to the second measurements, there was an increase in trainees' ability to structure the training situation. However, motivation scores declined over time, and stress increased. Taken together, the pattern of findings suggests that the progressive decline of stress levels is a consequence of adaptation to the situation, over which the trainees progressively gain control. However, as time passes, the trainees also seem to lose their initial enthusiasm, and this loss, coupled with the relentless physical and psychological demands of the training, functions as a new source of stress. It is difficult to do more than speculate, given the rather restricted sample employed--28 trainees--but the findings do provide fertile ground for hypothesis generation, which may serve later, and larger, research endeavors.

Drugs and Stress. An unfortunately common reaction to stress is drug abuse. Dr. Joaquim M. Carrilho of the Portuguese Air Force's Psychiatric Service discussed his work in drug and alcohol counselling. The Portuguese are the largest consumers of alcohol in Europe. This is not a happy distinction, since it suggests that some recruits may come into the forces already substance-dependent. In his informative talk, Carrilho described the program that he has initiated to help to offset the ravages of drug abuse in the Portuguese armed services. His approach borrows heavily from the model employed in the US Navy, which involves intensive, short-term group therapy in which patients live together and are forced to confront their problems, and each other, daily. The program has a good record of success in US settings, and Carrilho was quite hopeful that a similar approach would have a positive result in Portugal. In his talk, he discussed the modifications that would be made to the program to tailor it more closely to the Portuguese situation.

The Portuguese high command appears to recognize the importance of this work. They are investing heavily in developing a wing of one of their military hospitals in Lisbon to facilitate the needs of this treatment model. At the time of the conference, the paint was still drying on the walls of the new center, so no data on the effectiveness of the transplanted program were available. However, it is not unrealistic to hope, even to expect, that the transplanted and adapted drug rehabilitation model will prove effective.

Ireland

At this point in the conference, it was clear that some attempt at integration of the masses of information on stress, training, leadership, etc., was in order. This task fell on the capable shoulders of Lieutenant Colonel Coleman Goggin, of Ireland. Goggin presented an integrative view that drew from the historical as well as the scientific record. His wide-ranging talk, which somehow brought together such unlikely bedmates as Tutmos and Alexander, Julius Caesar and Fred Fiedler, was an example of eloquence and scholarship. It is impossible for me to draw together all the threads of Goggin's presentation. It must suffice to say that there is much that current research on stress and leadership could learn from a survey of the historical record, and of the assumptions about leaders that operated in the past and now. It is not at all clear that our view of the nature and function of leaders, their effectiveness in crisis situations, etc., is any better than that of our prescientific forbears who worked in relative ignorance of the nature of experimental design. As Goggin observed, this can be attributed either to the failure of the scientific method, or the intractability of the problem to which it is directed. In light of the success of the scientific method in so many other fields, acceptance of the second alternative seems almost inescapable. I am sure that Goggin would welcome requests for an expanded version of his talk.

5 SELECTION

Assignment of individuals into military specializations that maximize their particular mix of aptitude, physical capabilities, and temperament is the task of the selection system. At this year's IAMPS, four participants discussed various features of the systems that characterize their countries' military selection procedures. Interestingly, three of the four discussants focused on the specific issue of pilot selection. This emphasis underlines the staggering costs of training airmen. Given the costs involved in training pilots, it is necessary that those candidates who are chosen become proficient airmen. Errors in pilot selection are measured in terms of human lives and millions of dollars. Thus, valid selection in this critical and very expensive specialization is mandatory. Considerations of this type clearly motivate the intense concern with pilot selection. However, almost all military organizations are involved in selection of one sort or another, and it would be shortsighted to focus exclusively on pilot selection, no matter how important this particular activity may be. Accordingly, we turn our attention first to a general discussion of military selection, as presented by Lieutenant Colonel Aurelio Pamplona of the Portuguese Army.

Portugal

Formal selection procedures in the Portuguese Army are undertaken by the Army's Psychotechnical Studies Center, which was founded nearly a quarter century ago. The approach that has evolved over the years tests recruits in three general areas: aptitude, leadership, and personality. Longitudinal investigations which estimate the extent of covariation between differential aptitude and training success, between performance on SYMLOG-type instruments and leadership ability, and between psychological traits and adjustment to military life, success in the military, etc., currently are underway. Comparison groups in these

studies have been matched on educational attainment, and extent of prior military training. At this point, the predictive validity of the various personological variables that have been employed has not been determined, but Pamplona promised that in next year's IAMPS, some information of this type would be presented.

In assessing the rate of progress of the Portuguese selection machinery, it is important to realize that university psychology faculties have existed in Portugal for only about a decade. In light of this fact, it is clear that the development of selection technology in Portugal has proceeded with remarkable speed. Of course, the assembly of a large cadre of selection specialists remains to be accomplished, but all preliminary indications suggest that the Psychotechnical Studies Center will ultimately prove to be a very positive force for selection in the Portuguese military.

Austria

Some unique features of pilot selection in the Austrian Air Force, which deserve some very close scrutiny, were discussed by Dr. Franz Kleinferchner. In the beginning of the selection process, the winnowing procedure is much like that employed by almost all countries. Medical and psychological tests are administered to candidates at their draft boards; then, orthopedic evaluations are conducted 5 weeks after basic training begins; psychological preselection is undertaken about 1 week after the orthopedic exams. At this point, approximately 75 percent of the original group of potential aviators has been eliminated from consideration.

To select further, the Austrians employ a series of tactics, based on the ergopsychometric theories of Professor G. Guttman of Vienna University, which seem very different from those used elsewhere. Ergopsychometry is a strategy that assesses performance under stress as well as in the typically quiet, distraction-free environment of the testing laboratory. The aim of ergopsychometry is to differentiate the truly competent flyer from the "training champion"--the person who performs well in practice, but suffers massive losses of effectiveness in high stakes situations. Obviously, in settings involving enormous training costs and high safety risks, discriminating between qualified airmen and those who do not perform well under stress is of utmost importance. Accordingly, pilot selection in Austria is undertaken under varying conditions of physical stress, cognitive stress, and work load. This approach is an explicit recognition that stress does not necessarily degrade performance. Indeed, for some, stress is necessary to precipitate optimal behavior.

Another unusual feature of the Austrian selection system concerns the use of brain wave potentials. Research suggests that negative electrical potential in the cerebral cortex is higher when people are in heightened states of activity and readiness to perform. Accordingly, pilot candidates are monitored, and various tests are conducted when the brain wave potentials are high, and again when they are low. This testing variation is introduced to determine the airman's boundaries of performance as they are influenced by this particular (cortical activity) variable. Since brain wave potentials are naturally cyclical, the tests are activated when the respondents' own level of cortical activity reaches the appropriate level. No attempt is made to influence activity level itself. The approaches discussed by Dr. Kleinferchner are innovative and, we might assume, somewhat controversial. How much performance is explained by variations in cortical activity levels was not discussed here. Perhaps these tests have yet to be completed. With the costs of improper selection decisions so great, however, even minor amounts of predictive accuracy appear to be worth the effort.

Italy

Naval Research. Since the 1920's, all military flight activities in Italy have been coordinated by the Italian Air Force. Now, it appears that the Italian Navy will soon have its own sea-based naval aviation branch, with its own

aviators and planes. All medical and selection procedures for pilots in Italy to this point have been conducted by the Air Force Medical Institute. As such, according to Admiral Massimiliano Stracca, there is a dearth of information and research on the motivation, performance, training success, etc., of naval aviators. To begin to remedy this problem, Stracca gathered the records of 71 naval aviators, and compared these with those of 200 line officers. Both groups had already completed 4 years of mathematics and professional studies at the Naval Academy. In addition 410 applicants for the Naval Academy, and a small group of officers who had failed flight training, were also employed in some of the comparisons to be discussed. The specific questions of this interesting analysis are:

- Are there intellectual or personological differences between the aviators and the other groups?
- Are the differences statistically significant?
- Could selection be based on such differences? and, finally,
- Are the intellectual and personality factors assessed in the first selection procedure (before the Academy) valid predictors of success in flight training 4 years later?

Given the restricted number of aviators in the sample, it is not reasonable to expect a definitive answer to these questions. However, the results of this study did provide some very intriguing leads for the future. For example, the aviator group significantly exceeded the line officers in tests of verbal fluency and mechanical comprehension. This result is impressive because both groups had achieved good results in the Italian Naval Academy before entering flight school or officer training.

Personality differences also were evident in the comparisons. MMPI results showed that the aviators were more individualistic, self-governing, lively, and exhibitionistic than the line officers. (This trait list undoubtedly will confirm the stereotype that many already hold of flyers.) Compared with unselected applicants to the Naval Academy, the aviators appeared more stable, with better emotional balance. Data from Rosenzweig's picture frustration scale also were available, and their analysis revealed the aviators, relative to the line officers, to be more determined and more likely to confront obstacles aggressively.

These results, although preliminary, suggest that it might be possible to differentiate successful from nonsuccessful flight candidates even before their first day of Academy training. This observation, of course, must be read with considerable restraint, given the small sample size of the present investigation, and the relatively small (though significant) differences observed. The study is a good start, however, and its results should encourage further research of this type.

Research in the Army. The MMPI has also been found in the Italian Army to be a useful device for the selection of selection officers. Lieutenant Colonels Sandro Tomassini and Maurizio Laurenti of the Italian Army discussed a project designed to train officers in all branches to become experts in personnel selection. Their research strategy bore some resemblance to that of Stracca. In their study, Tomassini and Laurenti administered to 184 candidate officers a test of mental ability, a biographical questionnaire, and the MMPI. Results of the ability and MMPI instruments were compared with normed data gathered on a norming population of Italian males. As might be expected, given the preselection of officers that had already occurred, and their military training, the officers proved significantly more intelligent than the average male. They also differed in some significant ways on various subscales of the MMPI. In their discussion, Laurenti and Tomassini detailed the profile differences that characterized the successful candidate for selection school from those who were not successful, and from the population in general. Presenting the precise nature of these differences is beyond the scope of this report, but the implication that the MMPI

can be used successfully in such contexts is interesting and of potential utility.

Given the unpredicted nature of the obtained results, it would be good to see the findings replicated in a further study of the data already in hand. This could be done by first drawing a "hold-out" sample of, say, 50 of the 184 candidates, and basing the central analysis on the remaining 134 men (cf. Crano and Brewer, 1987). Results obtained in this sample could be compared with the hold-out group. If the findings replicated, greater confidence could be placed on the findings. Hopefully, this extension will be conducted. It will prove relatively inexpensive, and its findings could do much to bolster the strength of the inferences drawn from the overall pattern of data.

Germany

After passing the usual physical examinations, basic and professional training, etc., German flight candidates are selected for flight school on the basis of theoretical knowledge and a psychological assessment. If the results of the test are positive, selection for the particular type of craft the candidate is to fly is then undertaken. This selection process is done to determine whether the aviator should be trained to fly helicopters, jet fighters, etc. In the German Aviation Psychology Department, according to Dr. H.D. Hansen, this selection can be accomplished most efficiently through the use of flight simulators. Description of the complex computerized flight simulator used in Germany, its versatility, and utility, was the focus of Hansen's presentation.

The flight simulator that was described appeared to be capable of simulating almost any type of craft, and almost any type of flying condition. The test station resembles a general aviation cockpit, with a seat and all the standard aircraft elements, including landing gear lever, flap lever, frequency selection panel, stick, rudder, and throttle. Instruments are displayed on a CRT in the center of the cockpit. They include artificial horizon, airspeed indicator, altimeter, compass, rate-of-climb indicator, g-meter, and thrust indicator. On the forward instrument panel are an alarm indicator, landing gear lever, flap lever, and parking brake. Other visual displays are arranged so as to simulate the view through aircraft windows. In all, a horizontal field of view of 140 degrees is provided the trainee. The panorama can simulate a runway (for take-offs and landings), features of the ground, including buildings, roads, etc., and moving objects (tanks, other airplanes, etc.). The instruments and visual panorama are coordinated to present realistic and consistent information.

Each of the five "missions" programed for the simulator consists of three phases: demonstration, practice, and test. In the demonstration phase, all the necessary displays and controls are explained and demonstrated. During practice, the trainee performs the mission; his performance is compared with ideal flight parameters, and audio feedback is provided as soon as performance is outside predetermined limits. In the test phase, no feedback is given, but the actual flight parameters are monitored, compared with ideal performance, and stored for later analysis.

The five missions developed to this point include:

- Introduction (introduction to controls, etc., taxiing, takeoff, strait and level flight, change heading with 20, 40, and 60 degrees bank, return to base
- Takeoffs and touch-downs under different wind conditions
- Takeoff and leaving the circuit, low-level navigational cross-country flight with topographic check points
- Takeoff and 90-degree turn to altitude, recovery from unusual attitudes, formation flight, dogfight
- Penetration of a rotating tunnel (300×300-foot tunnel rotates around the longitudinal and transverse axes; pilot must fly level, with no instruments visible).

Performance data may be analyzed individually (in comparison to the ideal

flight pattern) or across a group of applicants. In this way, either absolute (individual) evaluations, or comparisons among a group of applicants, can be made. All of the software for both simulation and statistical evaluation is in place. At this presentation, no information on the quality of simulation-selected flyers was presented, but it is a fair bet that in time, some very precise figures regarding the effectiveness of the realistic computer-based simulation training procedures adopted by the German Air Force will become available.

Sweden

No matter how effective the flight training, air accidents will occur. The topic of Dr. Kristina Pollack's presentation was the psychological reactions of pilots involved in accidents in the Swedish Air Force. Pollack works as a flight psychologist for the Swedish Air Force, and as a psychological consultant for the Swedish Accident Investigation Board, which is charged with investigating all aircraft mishaps that occur in Sweden. Her training and experience make her an excellent resource.

In her research, Pollack investigated 40 Swedish pilots who had been involved in a flight accident, 29 of whom had ejected from high-performance aircraft. The purpose of the research was to evaluate the emotional experiences of the pilots, their attitudes toward further flight service, and their views regarding the proper treatment of downed airmen. All pilots answered a questionnaire which requested objective and subjective information about their physical and psychological status before the accident, the characteristics of the crash or ejection (decision time, etc), G-load, etc. Information about the crash and rescue conditions also was gathered, along with data relating to the medical and emotional consequences of the accident.

Pollack's investigation revealed some interesting findings: As shown in Figure 1, 65 percent of the pilots in the sample were back to flight service less than 1 month after their accidents, and only 9 percent did not return, owing to physical, rather than psychological, reasons. No pilot expressed any reservation about returning to flying. However, the majority of the sample of pilots reported rather significant attitude changes after their crash. (One pilot graphically described his crash experience as "wrestling with a bear-and winning!") They were more aware of the risks of their profession, and also expressed greater appreciation of the simple things in life.

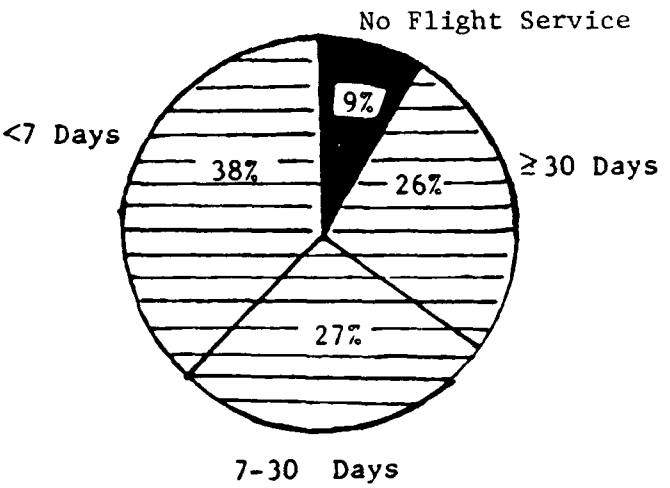

Figure 1. Proportion of pilots returning to service after a crash.

There appeared to be no relationship between experience (flying hours) and a pilot's emotional reaction to his crash. What seemed to matter was the extent to which the circumstances surrounding the accident varied from normal procedures, because this affected the reactions of the pilot's flying mates, and it was the response of the pilot's peers that appeared to be crucial to his reintegration into the unit, and his consequent emotional response.

6 ORGANIZATIONAL DEVELOPMENT

Norway

Over the years, organizational psychologists have proved their value in a host of complex business settings. However, the military, one of the very

largest of organizations, has generally proved less than completely taken with the promise of organizational psychology. If the presentations of two of this year's IAMPS participants is indicative of a general trend, this state of affairs appears to be changing. In the first of these, Drs. Ivor Floistad, Per Barda, and Laila Ekrem discussed their involvement in an organizational development project in the Norwegian Air Force. In part, the project is aimed at enhancing retention; more importantly, the ultimate goal is the enhancement of operational effectiveness. An important feature of this project is the active involvement and encouragement of the highest officers of the Norwegian Air Force. The steering committee consists of Norway's Inspector General, the Chief of Staff, and five colonels. The project group (to which Floistad, Barda, and Ekrem belong) operates directly below the Steering Committee.

The approach employed in this study is typical of that of many previous studies of organizational development. Put most simply, the task is to describe the operational situation as it now is, and to determine what it could be, ideally. To foster this work, Floistad and his colleagues administered three surveys: an analysis of the working climate, a survey of the relationship between Air Force Headquarters and the technical schools, the officer schools, etc: and a measure devoted to discovering the driving forces, or motives, that influence the behaviors of the Headquarters staff.

Working climate. The working climate survey asked respondents to provide information on the following features:

- Challenges (do we feel challenged, stimulated, etc.)
- Freedom (who can make decisions, changes, etc.)
- Idea Support (are new ideas accepted, is the climate open to innovation)
- Trust (do we trust one another)
- Cooperation (can we work together)
- Information (how accessible is the available information)
- Liveliness (what is the energy level, or liveliness of the working environment)
- Risk Taking (how great is the tolerance for taking risks)
- Discussion (how much is characteristic of the setting)
- Conflict (how much is evident).

Results disclosed that respondents felt that freedom, idea support, availability of information, and risk taking were not supported to the extent that they should be in Headquarters. On the other dimensions, there appeared to be general satisfaction.

Relationship between Headquarters and other units. In this phase of the research, interviews were conducted with Headquarters personnel and with those directly affected by their decisions (training schools, etc.). On the basis of the information gathered in the interviews, questionnaires were constructed and distributed widely throughout the Air Force. These instruments disclosed five major issues that must be addressed by Headquarters. First, most felt that personnel policy did not foster retention of good officers. Headquarters appeared inflexible in the face of technical staff (and other personnel) shortages. This resulted in demands for considerable overtime, which was not compensated adequately. Finally, Headquarters was viewed as having no long-term personnel allocation plan, and this precluded officers from effectively planning their futures. (This factor, as might be recalled, appeared as a significant factor in the loss of qualified officers in the Australian Army, as detailed by LTCOL Hodge, whose work was discussed earlier in this report.)

Driving Force. Unfortunately, one of the most intriguing questions of the research--namely, what motivates the staff officer--has not as yet been addressed. When this factor is measured, all of the ingredients for a very interesting organizational development operation will be in place. Put most simply, we will know on the basis of this research how thing are; we will know how things should be, at least in the

opinions of those involved; and we will know what motives to emphasize to move from given to ideal. Of course, implementing all of this is not quite so simple, but a grand start has been made, and it will be very interesting to learn of the actual changes that are undertaken in light of the information gathered.

Israel

Preliminary plans for another military organizational development project were discussed by Dr. Sarah Shavit of the Israeli Defense Forces. This project entails the development of a method for estimating the operational capability of division units. Previous organizational development research in Israel has demonstrated the relationship between military/operational readiness and organizational climate. The importance of this correlational finding is the implication that by modifying features of the organizational climate (e.g., change in group norms, commitment to task, leadership style), one might improve the level of operational readiness. Shavit plans to exploit this possibility by assuming a causal link between organizational climate/development and operational readiness.

In this project, plans are being made to construct a measure of the performance of a unit. This measure will include an assessment of the training systems in place, the understanding of staff of combat doctrine and operations, etc. Then, measures of the individuals within units (what Shavit calls "human resources") will be collected. Included in this set of measures will be standard biographical data, information on skills, military experience, selection results, promotions, grades, personnel evaluations, etc. Organizational psychologists then will attempt to determine the relationship between these individual characteristics and variations in unit effectiveness.

There is much that data of the sort envisioned can be made to do. Perhaps most obviously, the relationship between human resources and unit effectiveness can be used to help modify training procedures. Gaps in knowledge can be identified and offset. Effectiveness at the division level can be determined. Having objective data on unit effectiveness facilitates the development of follow-up training devices to offset earlier-discovered shortcomings. Performance criteria can be used to develop a uniform scale to assess the outcome of military exercises.

Perhaps one of the most important features of Shavit's approach is the projected development of hard measures of unit (vs. individual) capability and performance. Even if the research were to stop at this point, a contribution of immeasurable importance will have been made. However, the ambitions of the project reach beyond the measurement of effectiveness to its attempted manipulation. By integrating individual characteristics and performance levels with unit outcomes, we have the possibility of a major advance in the development of highly effective military units.

At this point, it is difficult to determine the feasibility of the plans discussed in this presentation. The plans are so audacious, the necessary technical development so daunting, that it would be foolhardy to assume a completely positive outcome. However, the potential of this attempt is great, and recognized by those in a position to see that the research is pursued assiduously. If the combination of nomothetic and ideographic measurement approaches operates as planned, a very major advance will have been made. If these measurements then give rise to systematic attempts to manipulate unit effectiveness, then the contribution will prove even greater. And even if such manipulations fail, the development of hard measures of some very elusive phenomena will more than justify the enormous effort that such a project will require.

7 TECHNOLOGY AND TECHNOLOGY TRANSFER

United States

The final projects discussed at the conference had to do, broadly, with the transfer of technology from the research to the military community. The first of these presentations, by Colonel Ford

McLain of the US Army Research Institute (ARI), was concerned directly with technology transfer. McLain's group in Frankfort, West Germany, is charged with a number of different aspects of technology transfer, including troop support, providing technical advice, evaluation of R&D, and foreign exchange. In his wide-ranging presentation, McLain presented a picture of the ways in which technology is transferred into the hands of the soldier. First, the analyst must assess the requirements of the organization which, in this instance, is the US Army in Europe. This is a major job, since 30 percent of all of the Army's forces are stationed in Europe. After the assessment, the analyst must determine if a solution to the requirement already exists. If it does, then ARI provides this solution to the appropriate unit. If no solution appears to exist, ARI is charged with firmly documenting the need for research and development, and for seeing that such research is undertaken. Then, transfer of the new technology can be undertaken.

McLain provided a very nice example of the application of an existing technology to a problem encountered in the Army. We begin with a series of apparently unrelated observations.

- Mortar crews must understand basic trigonometry in order to make effective use of their weapon.
- The mathematics necessary for accurate mortar firing is taught to all mortar crewmen.
- Crewmen forget.
- Very effective computerized training technologies for mathematics exist.

How do these factors relate to one another? McLain described the development of a small, lap-sized instructional machine, which can be used by mortar crewmen to review and update their mathematics skills. Figure 2 presents a illustration of this machine. Some features of the instructional machine deserve mention. First, it is lightweight and thus portable. Its shell is quite sturdy, and folds to encapsulate the entire device. This enhances its utility in extreme conditions. In operation, the machine is simplicity personified. The material to be learned is presented in text form at the top of the (unfolded) machine. Questions are posed via a built-in CRT, and the respondent need only press a button to respond. The computer-presented data are stored on a chip, and different chips have already been developed for different applications. The machine can provide auditory feedback to respondents, and this, along with the visual nature of the presentation, serves to maintain motivation. As suggested by the illustration, no programing skills are necessary in order to use the machine.

In many ways, this machine is little more than a kind of simple teaching machine which is already widely available in today's market for the enjoyment and edification of children: Texas Instruments' "Speak and Spell," or "Speak and Math" come readily to mind. These machines, like the model under discussion, present problems ("How much is 2 + 9"), reinforce correct answers, encourage rethinking in the case of incorrect responses, and provide an overall score on an apparently infinite number of exercises, graded with regard to difficulty. In this sense, nothing new had to be created to fill the training need evidenced by the declining marksmanship of the typical mortar crewman. The transfer of the technology, however, provides a very powerful means of alleviating the problem. Coupled with its versatility--it can be used to teach or refresh almost any topic--its cost (less than $200 per item), and its apparent effectiveness, the instructional machine provides an excellent example of technology transfer in action. Indeed, if such technology were not available, it is a good bet that it would have been invented to fill training needs which become ever more demanding as the complexity of weapons systems continues to grow.

A number of examples of the variety of settings into which the instructional machine has already been placed (e.g., M-60 machine gun operations, celestial navigation, vehicle recovery operations, etc.) were provided, and the diversity of

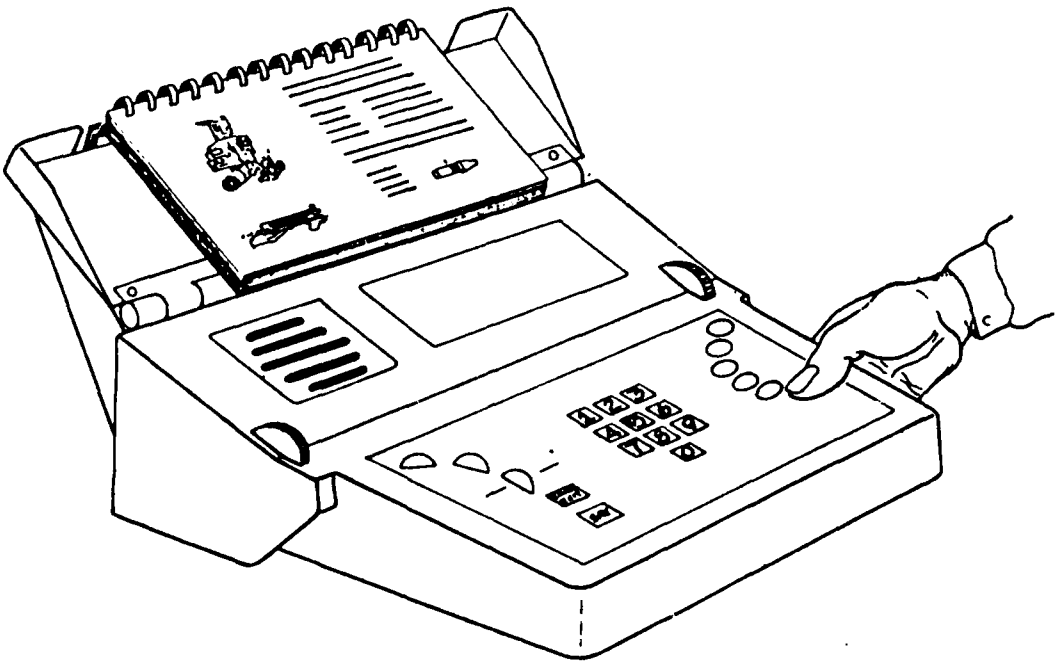

Figure 2. Computerized hand-held instructional prototype.

these settings speaks well for the utility of the approach. In closing his address, McLain gave some suggestions regarding means to improve the transfer of basic knowledge to usable technology, and these ideas deserve serious consideration. First, he argued that we must develop a clearer definition of a "successful" transition. Too often, he argued, we are content with a product that is not really operational--i.e., in the hands of those for whom it was designed. Short of this, the product is not successfully transferred. We need a better framework for linking mature technologies with operational problems. We need to reward researchers for successful transfers of basic knowledge to applications. We need better communication between the research community and the user community, a better bridge between academics and military applied research. Finally, we need to understand the process of transition itself.

Some inroads already have been made into problems of this type, at least in situations involving the transfer of technology in underdeveloped groups. In communication research, for example, considerable effort has been expended in understanding the diffusion of agricultural innovations in agrarian societies (cf. Rodgers and Schoemaker, 1971). However, a more focused emphasis on the problems of transfer of basic scientific, mechanical, or mathematical knowledge into settings involving relatively complex, technologically advanced systems would appear to hold much promise. Hopefully, McLain's ideas regarding the facilitation of technology transfer will provide such an emphasis.

Canada

Of all the technologies of social science, the method of survey research is one of the most developed. Today, with

sufficient resources, social scientists can predict to within a fraction of a percentage point the attitudes of a selected population on almost any issue. Indeed, the success with which "pollsters" ply their trade has led some to demand that poll results not be broadcast during an election, since they might sway the outcome of the contest. It is somewhat surprising that up to now, selection specialists have not used information of this type to anticipate potential problems they might encounter in attracting young men and women to the armed services. Of course, the usual demographic indicators have, in the past, proved extremely useful in allowing the military to predict the extent to which staffing issues would become problematic, and in general, standard census-type indicators have proved very useful. However, the beliefs and values of the cadre of eligible youth also influence enlistment and retention rates, and these "soft" indicators, although easy to measure, have in the main been neglected (cf. Segal and Sinaiko, 1986). The Canadian Forces have developed a strategy aimed at overcoming possible problems of this type by developing a system whereby they keep close tabs not only on standard socio-demographic trends, but also on social attitudinal data of enlistment-age youth. As described by Major Claude Hamel, the Canadian Forces Socio-Demographic Trends Information System can provide the mechanism whereby more accurate forecasts of enlistment and retention rates may be developed. Since the Canadian Forces are an all-volunteer organization, such information is invaluable.

The information system developed by the Applied Research Unit of the Canadian Forces will make use of a "core" and a "supporting" database. The core database consists of the regular statistical series and forecasts that are developed as a matter of course. The statistical series includes data on age-specific labor force participation rates, unemployment, etc. The supporting data base will take advantage of irregularly scheduled, occasional statistical studies, such as those supplied by Statistics Canada, on a wide range of topics (e.g., migration patterns between provinces). In addition, forecasts and socio-attitudinal studies which do not lend themselves to systematic computerization also will be input into the information system. Conceptually, the information system is designed to capture the following types of information:

- Population growth and change
- Life cycle (i.e., changes in the sequencing of education, work, marriage, dual-career families, etc.)
- Technological change and competitive pressures
- Trends in employment
- Trends in education
- Youth values and attitudes
- The regulatory environment
- Aging, health care, and social security, and their impact on defense spending.

The model of the Canadian Forces Social Demographic Trends Information System is presented in Figure 3. As shown, primary emphasis will be placed on the statistical series information. This is reasonable, since such data generally are statistically and methodologically more robust than those arising from other sources. However, the softer data will be used to provide a context within which more fine-grained interpretations of the statistical series data might be fostered.

This approach has much to recommend it. It makes use of both traditional and innovative data sources to come to some understanding of the likely personnel supply for the Canadian Forces. There remains the issue of the fit of research findings with selection policy, or of the modification of predictions based on the standard indicators by data discovered in the secondary sources, and these problems are important. However, their solution promises much greater predictive sensitivity. Reliance on the standard statistical approaches avoids such problems, since there is no innovative data to fit with the usual information--and no possibility of improving upon the standard estimates either.

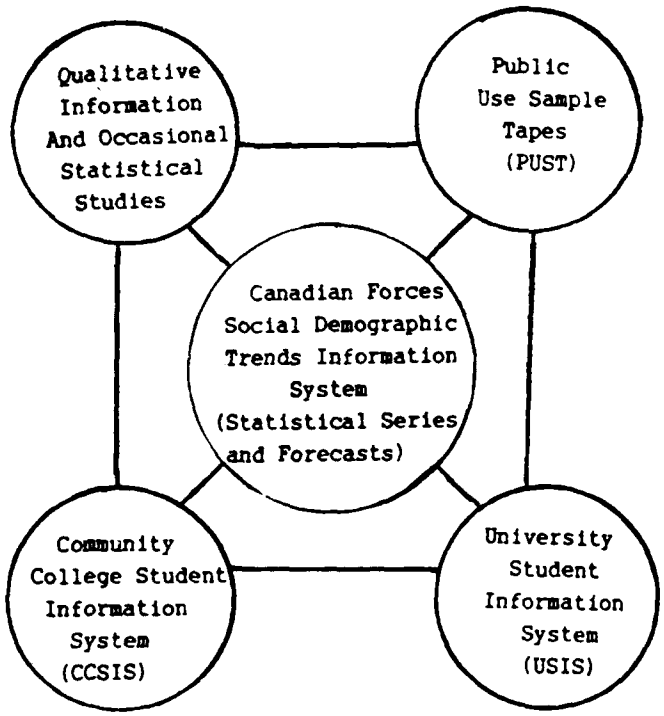

Figure 3. Canadian forces social demographic trends information system and supporting data sources.

8 CONCLUSION OF THE CONFERENCE

As is traditional, the final official action of the symposium was the selection of next year's host. Also in accord with tradition, only one country was prepared to assume the responsibility. The country was Canada. The Canadian contingent argued persuasively not only for the choice of their country as the next IAMPS host (a foregone conclusion, given the alternatives), but also for the venue of the symposium, the great city of Toronto. I was somewhat taken aback by this latter suggestion. While I am a great admirer of the city, it was clearly a departure from tradition to hold the conference in North America, even though this continent gave birth to IAMPS nearly 25 years ago. Major Hamel and Captain Lamerson, however, observed that it was not unreasonable to hold the conference in North America once every quarter century.

The major problem with the Toronto venue, of course, is its potentially negative effect on European participation. This, however, is an empirical question, and since the participants at IAMPS typically are empiricists, we attempted to determine the perceptions of the delegates to this proposal. Accordingly, every participant was polled in an open meeting. Almost without exception, the delegates reported that the Toronto venue would not add to the difficulties of attending. As Lieutenant Colonel Scheppes of Israel stated, the decision to attend the conference is based on the evaluation of the importance of the meeting. If the meeting is deemed important, cost differences (at least as measured in terms of a few hundred dollars) are meaningless--they do not enter into the decision. Substantial agreement with this view was voiced by nearly all the delegates, and thus, unless unforeseen events intervene, the twenty-fourth International Applied Military Psychology Symposium will meet in June, in Toronto, Canada. Hope to see you there.

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